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(54) **Wrist-carried radiotelephone**

(57) A portable radio telephone device which is in the form of a wristwatch which is fastened to the user's wrist via a strap. The telephone device is comprised of two main components, a case and a strap. The case has a display and a transceiver. The strap or band has at least a top and a bottom layer which are attached to the case. The top layer of the band is releasable in the proximity where the case and strap meet. However, the top layer remains connected to the bottom layer of the strap by a pivotable hinge. The pivotable hinge is typically located opposite the case and permits the top layer to be rotated. The length of the top layer can be increased either by repositioning the case or having additional layers located beneath the top layer. The speaker is located on the end of the released top layer. The microphone is located on the band. When the top layer is released and rotated, the speaker is located in the palm of the user's hand and the microphone is positioned along the inside of the user's forearm. This design provides for a private telephone conversation without the removal of the telephone device from the user's wrist.

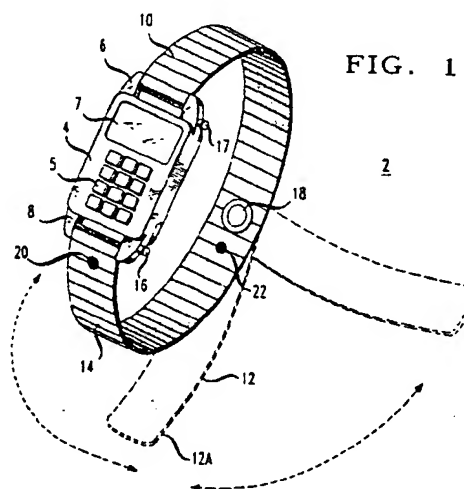


FIG. 1

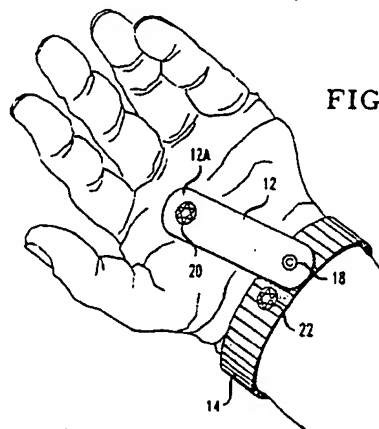


FIG. 2

## Field of the Invention

This invention relates to a portable radiotelephone device in the form of a wrist instrument.

## Background of the Invention

Recent progress in microelectronics has greatly miniaturized radio communication devices such as receivers, transmitters and antennas. This miniaturization has permitted the integration of these components into wrist-carried radio devices.

While a number of wrist telephone designs have been explored, none are completely satisfactory. In one design an antenna and loudspeaker are embedded in the wrist strap. The loudspeaker is used also as a microphone, but presumably not at the same time that it is used as a loudspeaker. This type of device, however, lacks privacy because the hearing device is the loud speaker and the volume of the device must be loud because the device is not located near the user's ear. In addition, the battery required to operate the speaker is quite bulky. In another wrist radio device the microphone and speaker are located at the ends of the wrist strap. To use this device, however, the user must remove the device from his wrist and hold one end of the strap in front of his mouth and the other end near his ear. The microphone and speaker must be sufficiently spaced apart to avoid feedback between the components. Another drawback of this device is the tendency to put it down and leave it behind. Yet a third design comprises a wristwatch radio receiver with a receptacle embedded in one strap end for receiving a connection jack for an earphone. However, a separate attachment is needed for the earphone, and this attachment is likely to be lost or misplaced.

Thus there is a need for a practical wrist radiotelephone which can be easily carried on the person, which can permit private conversation, and which is free of easily lost components.

The preferred embodiment shows a wrist radiotelephone device which is fastened to a user's wrist via a strap. The telephone device is comprised of a case having a display, transceiver and battery therein. The strap, which is attached to the sides of the case, has at least two layers, a top and a bottom layer. Embedded within the strap are a microphone and a speaker which are connected via conductors to the transceiver located in the case. The antenna may be located in the strap or the case of the device. The speaker is located on the end of the top layer of the strap, and the microphone is located on either the bottom layer of the strap or the end of the top layer opposite from the speaker. The top layer separates from the bottom layer in the area where the strap is attached to the case. The length of the top layer can be increased either by positioning the case in a nonstandard position such

as on the side of the user's wrist or by providing additional layers of folded strap to telescope out when the top layer is released. The top layer of the strap remains attached to the bottom layer via a hinge which also permits the top layer to rotate. The hinge is usually located at a point opposite the case. The released top layer rotates such that the speaker is located in the palm of the user's hand and the microphone is located along the inside of the user's forearm.

Positioning the speaker in the palm of the user's hand and the microphone along the inside of the user's forearm permits the hand to be placed over the speaker and the user's ear to cut out background noise and the microphone naturally falls near the user's mouth. This design provides a private telephone conversation without removal of the telephone device from the user's wrist. Additionally, the device can be used as a watch, pager or bracelet when not being used as a telephone.

## Brief Description of the Drawings

FIG. 1 is a perspective view of a first embodiment of a wrist telephone device.

FIG. 2 is a perspective view of the wrist telephone device with the top layer of the strap in the released and open position.

FIG. 3 is a simplified drawing of the wrist telephone device of FIG. 1 when it is being used as a telephone.

FIG. 4 is an elevational view of a modified wrist telephone device.

FIG. 5 is a perspective view of the wrist telephone with a telescoping top layer.

FIG. 6 is an elevational view of another embodiment of the wrist telephone device in the closed position.

FIG. 7 is a perspective view of the wrist telephone device with the top layer of the strap in the open position.

## Detailed Description

Referring to the drawings, FIG. 1 shows a wrist radiotelephone 2. The telephone 2 is comprised of two main parts, a telephone case 4, and a multilayer strap or band 10. The strap 10 is attached to the case 4 and holds the case 4 onto the wrist of a user. The case 4 contains a conventional miniaturized transceiver (not shown) designed to provide two-way mobile telephone communications, a means for initiating a telephone call with a keyboard 5 or voice recognition device (not shown), a display 7 and a power supply such as a battery (not shown). Timekeeping, alarm or pager circuitry can also be incorporated into the case 4.

The case 4 is attached to the band by any number of ways. The two most common are mounting the

case 4 onto the strap 10 or fastening the strap 10 to the upper and lower sides 6 and 8 of the case 4 as shown in FIG. 1. A clasping means 17 such as a button or lever is located on the sides 6 or 8 of the case 4 and/or strap 10 which enables the strap 10 to be released from the case 4. The clasping means 17 also enables the size of the strap 10 to be adjusted so that the device 2 fits over a user's hand and can be fastened to a user's wrist. A safety strap (not shown) can also be attached to the case 4 and strap 10 to help prevent loss of the device 2. The strap 10 has attached thereto a top layer 12 which is the outer layer and a bottom layer 14 which is the inner layer in contact with a user's wrist.

A releasing means 16 such as a button or lever is located on the side of the case 4 and/or strap 10. When the releasing means 16 is activated, the top layer 12 detaches from the bottom layer 14 in the area of the band 10 that is in close proximity to the upper side 6 or lower side 8 of the case 4. The top layer 12 remains attached to the bottom layer 14 via a pivotable hinge 18 which is typically located opposite the case 4. When the top layer 12 is released, the pivotable hinge 18 permits the top layer 12 to rotate approximately  $\pm 90^\circ$  for left or right hand use. Rotation of the top layer 12 is typically towards the user's hand so that the released top layer 12 is perpendicular to the strap 10 and located in the palm of the user's hand, as shown in FIG. 2.

As shown in FIG. 2, the speaker 20 is located on the unfastened end of the released layer 12A. The microphone 22 is located either on the top surface of the bottom layer 14 in close proximity with the hinge 18 or on the top layer 12 incorporated into the hinge 18. Rotation of the top layer 12 places the speaker 20 in the palm of the user's hand and uncovers the microphone 22 which is positioned along the inside of the user's forearm. The speaker 20 and microphone 22 are connected to the transceiver via separate pairs of conductors (not shown) embedded in the strap 10.

When the top layer 12 is released and rotated, the device 2 is in the open position which causes the device 2 to be "off" hook, placing or receiving a call. In the open position, a user simply places the palm of their hand over their ear to use the device 2. Placing the speaker 20 in the palm of the user's hand and the microphone 22 along the inside of the user's forearm creates a private environment in which the user can have a conversation. Additionally, the device 2 does not have to be removed from the user's wrist to be used and the rotation of layer 12 does not interfere with shirt or coat cuffs. FIG. 3 shows the telephone device 2 before the hand and speaker 20 are brought to cover the user's ear. When the top layer 12 is attached, the device is in closed position and the device 2 is "on" hook. In the closed position the device can be used as a watch, alarm, pager or bracelet. In this mode the speaker 20 can be used to provide a con-

ventional radio alarm signal for an alarm watch, or the device can be programmed to receive and send paging signals.

Increasing the length of the released layer 12 is accomplished by placing the case 4 in a nonstandard position along the side of the user's wrist, and having the hinge 18 remain in the location as shown in FIG. 4. In this position, the speaker 20 is located further up in the palm of the user's hand and closer to the user's ear when band 12 is released and rotated. To increase the comfort of this nonstandard position of the case 4, the bottom of the case 4 has the shape of a saddle, which fits around the side of the user's wrist. Additionally, this nonstandard position of the case 4 is easy to read and keeps the face of the case from scratching.

An alternative to repositioning the case 4 is to provide additional layers 13 which are serially connected to the top layer 12 folded underneath the top layer 12. When the top layer 12 is released the additional layers 13 telescope out as shown in FIG. 5, placing the speaker 20 closer to the user's ear.

FIGS. 6 and 7 illustrate another embodiment of the invention, wherein both the speaker 20 and the microphone 22 are located on the released layer 12. In this embodiment, the the strap 10 has at least two layers, a top layer 12 and a bottom layer 14. However the top layer 12 releases from both the upper 6 and lower 8 sides of the case 4 in the area where the strap 10 attaches to the case 4. When the release means 16 is activated, the top layer 12 releases from the bottom layer 14. The released top layer 12 remains connected to the bottom layer 14 by a pivotal hinge 18, typically located opposite the case 4. The speaker 20 and microphone 22 are located on opposing ends 12a and 12b of the top layer 12. The released top layer 12 is rotated approximately  $90^\circ$  so that the speaker 20 is located in the palm of the user's hand and the microphone 22 is located along the inside of the user's forearm. The length of the top layer 12 can be increased in the same manner as described above.

The strap 10 is made of materials that are relatively stiff so that when the top layer 12 of the strap 10 is released and rotated, the top layer 12 will remain in an "up" position. At the same time, the top layer 12 must be flexible and deformable enough to be attached around a wrist. Stiffness may be accomplished by using a spring material for the conductors which are inside the strap or by including a layer of stiff plastic.

Although the present invention has been described in connection with radio frequency, it is to be understood that the device is equally useful with infrared and other transmission facilities.

The part 12 can be pivotally mounted on the outside of the strap 10 as shown in the drawings, or it can be pivotally mounted on the inside of the strap 10, namely between the strap and the wrist in a manner not shown.

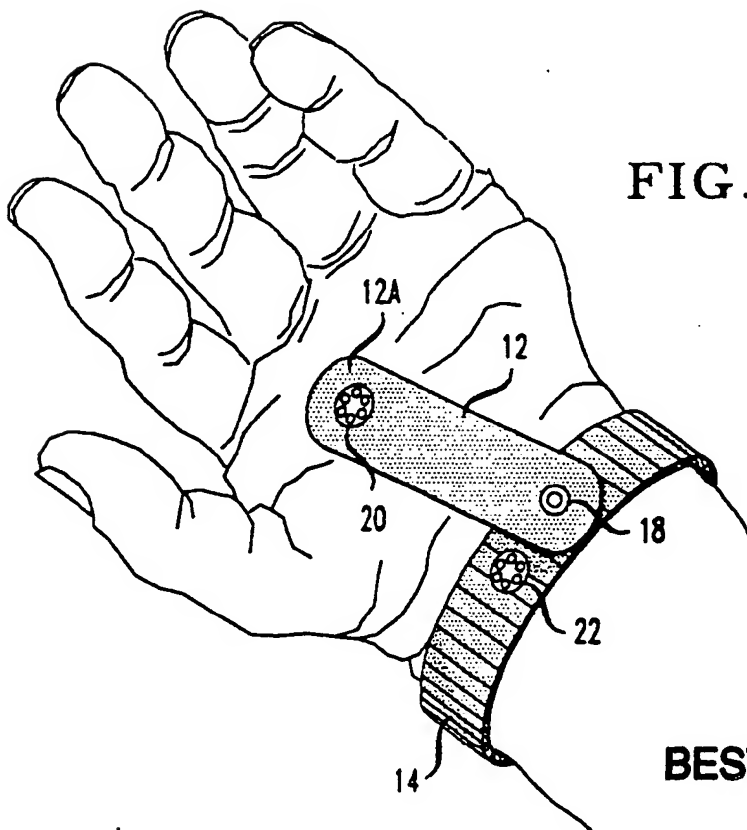
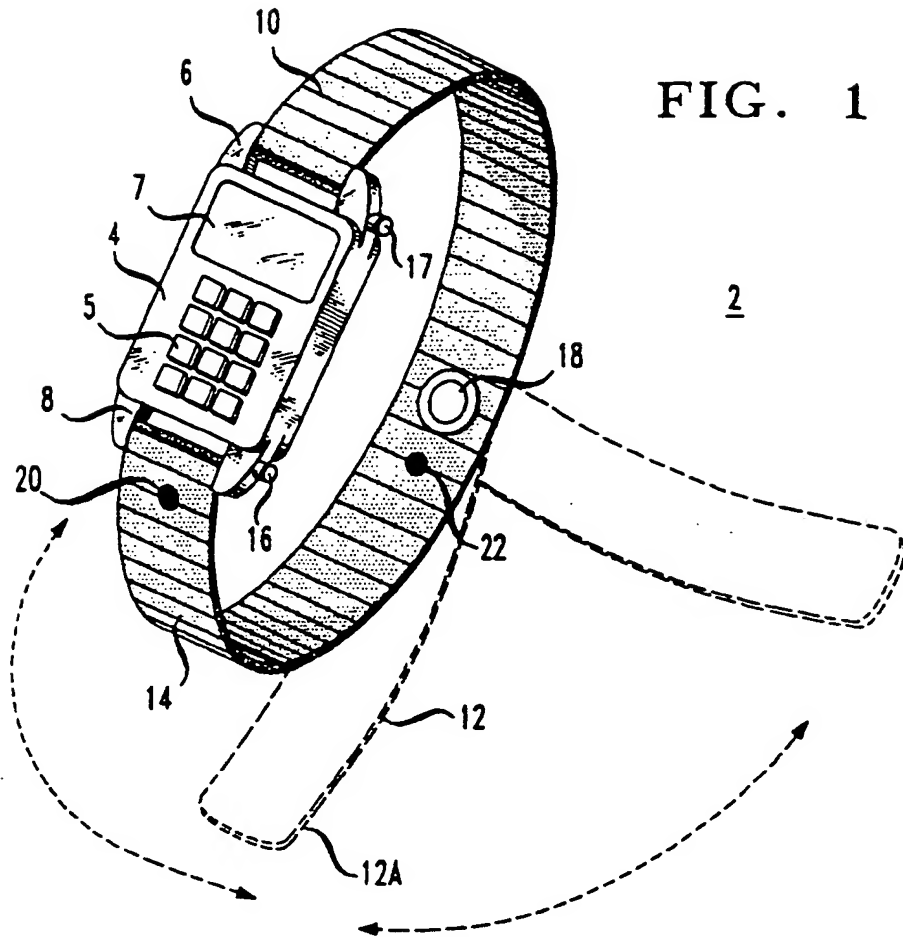
Alternatively the part 12 can be a type of telescope arrangement mounted within the case when in the inoperative position, and arranged to be pulled out from the case to the operative position. It is convenient to have the microphone adjacent to the end of the telescope arrangement.

## Claims

1. Wrist mountable transceiver apparatus, comprising a transceiver, a strap (10) for attaching the transceiver to a user's wrist, and a microphone (22) and loudspeaker (20) electrically connected to the transceiver, characterised by a part or parts (12) movable relative to the strap or the case, from an inoperation position to an operative position, said part supporting the microphone and/or the loudspeaker, so that when the apparatus is brought to an operative position with respect to the user, the microphone and loudspeaker are in positions to enable transmission and reception to occur.
2. Apparatus according to claim 1 wherein the transceiver apparatus is a radiotelephone apparatus, and wherein the said part is pivotally mounted on the strap and movable from the inoperative position in which the said part lies adjacent to and parallel to the strap, to the operative position in which the said part lies at an angle to the strap.
3. Apparatus according to claim 1, or 2, wherein the transceiver is mounted within a case (4) attached to the strap.
4. Apparatus according to claim 3, wherein one end of the said part is slidable from the case to assume the operative position, and contains a microphone thereon.
5. Apparatus according to claim 3, wherein the said part contains a loudspeaker thereon, and wherein the microphone is located on the strap or in the case.
6. Apparatus according to claim 3, wherein the said part contains a microphone thereon, and wherein the loudspeaker is located on the strap or in the case.
7. Apparatus according to claim 2 or 3, wherein the said part(s) contains at spaced locations thereon a microphone and a loudspeaker.
8. Apparatus according to claim 2 or to any claim as appended thereto, wherein the said part(s) is/are

pivotally mounted on the strap in such a way that when the said part is in the inoperative position it either overlaps at least part of the strap, or it fits underneath at least part of the strap.

9. Apparatus according to claim 8, wherein when the said part overlaps at least part of the strap and is in the inoperative position, the said part is releasably attached to the strap by release means (16).



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FIG. 3

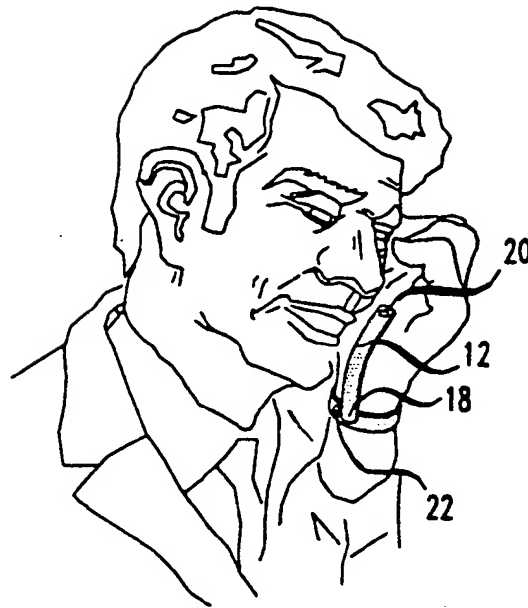
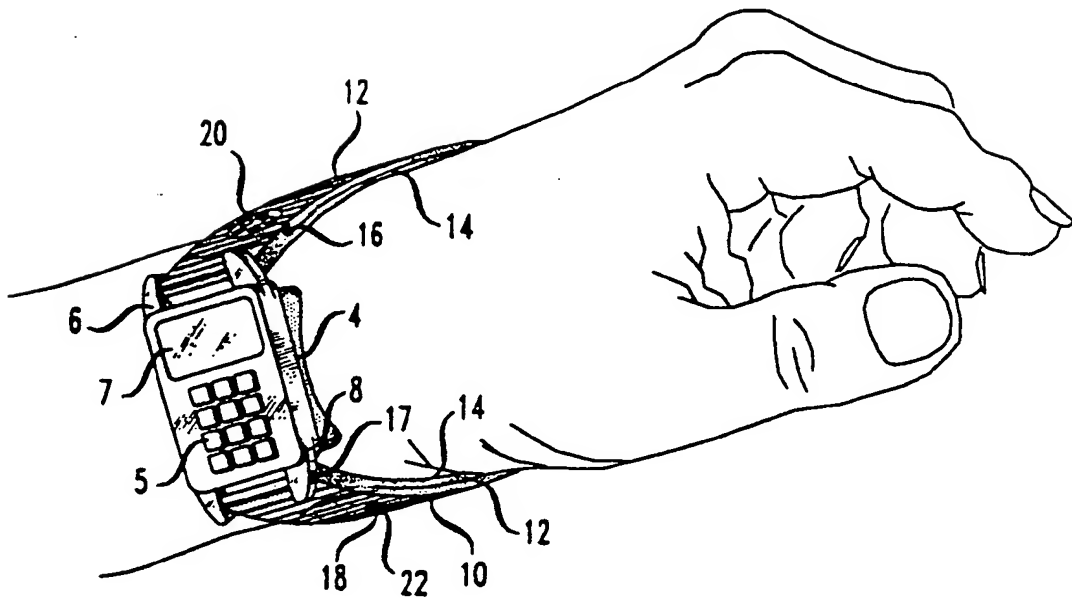
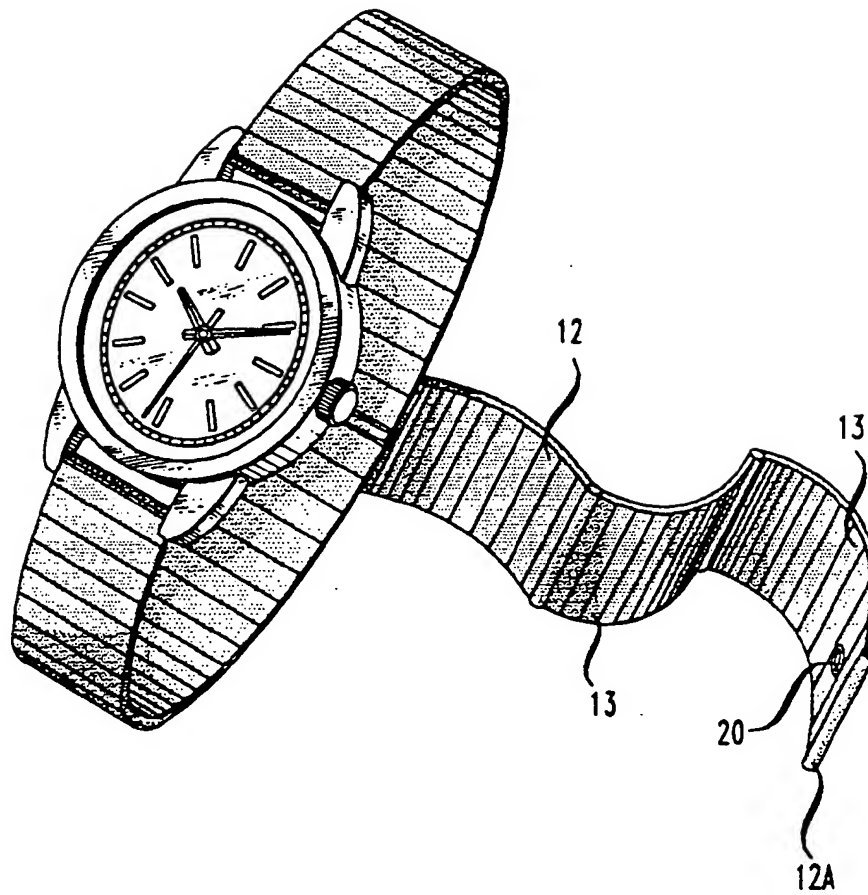


FIG. 4



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FIG. 5



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FIG. 6

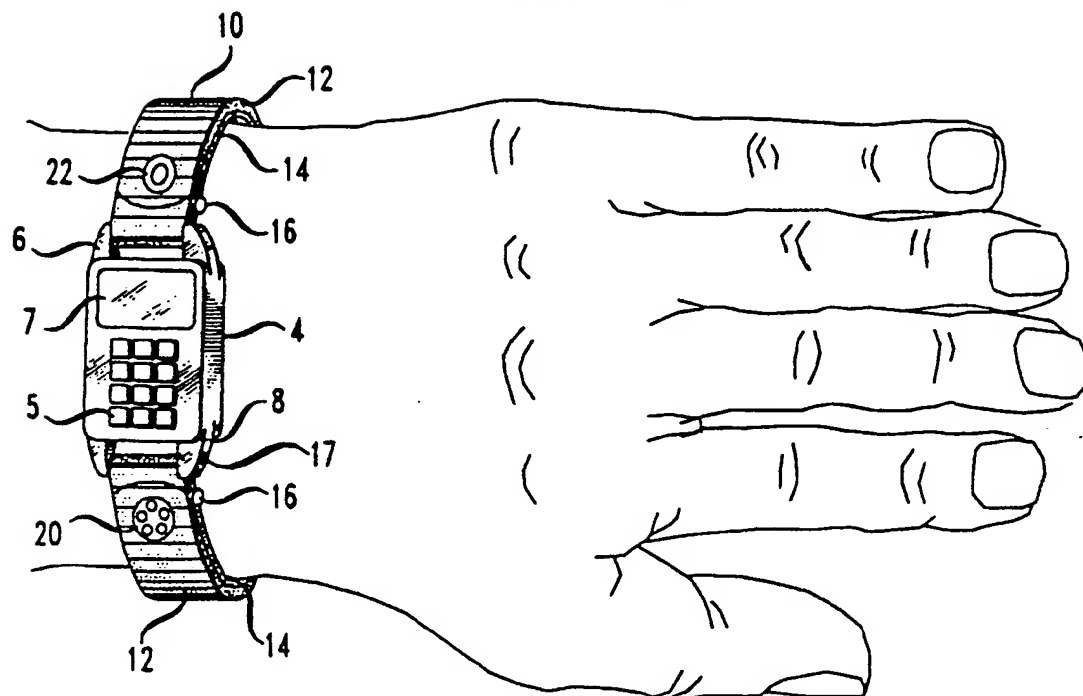
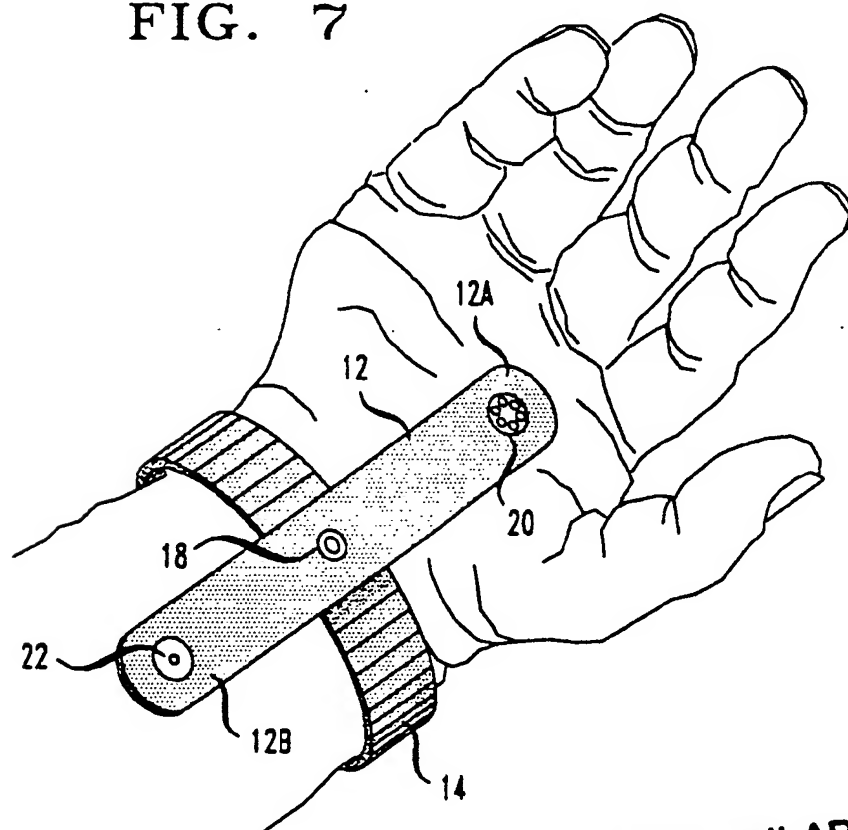


FIG. 7



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# EUROPEAN SEARCH REPORT

Application Number

EP 93 30 4118

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 847 818 (OLSEN) * column 2, line 63 - column 5, line 20; figures 1-8 *	1,3,5,6	H04M1/02 H04B1/38
A	----- PATENT ABSTRACTS OF JAPAN vol. 15, no. 405 (E-1122)16 October 1991 & JP-A-31 65 200 ( KIMITO HORIE ) * abstract *	1,3,5	
A	----- US-A-5 008 864 (YOSHITAKE) * column 3, line 14 - column 6, line 63; figures 1-9 *	1,3,5,6	
P,X	----- PATENT ABSTRACTS OF JAPAN vol. 16, no. 255 (E-1214)10 June 1992 & JP-A-40 56 530 ( SANYO ELECTRIC ) * abstract *	1,3,5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H04M H04B G04G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06 SEPTEMBER 1993	Examiner DELANGUE P.C.J.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons</p> <p>-----  &amp; : member of the same patent family, corresponding document</p>			

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